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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/765,246 | 01/27/2004 | David R. Swenson | 11460-130 | 9561 |

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BOSTON, MA 02108

EXAMINER

HASHMI, ZIA R

ART UNIT PAPER NUMBER

2881

DATE MAILED: 05/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/765,246 | SWENSON, DAVID R. | |
| | Examiner | Art Unit | |
| | Zia R. Hashmi | 2881 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 January 2004.
- 2a) ☐ This action is **FINAL**.
- 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 1/27 & 11/22/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-34 are rejected under U.S.C. 103(a) as being unpatentable over Dykstra (6,770,874), in view of Mack et al (6,831,272).

3. With respect to independent claims 1, 8, 13, 18, 23, 26, 29, and 32, Dykstra discloses methods and equations for measurements of various parameters of cluster ions in a cluster ion beam (col. 2, lines 17-21 and equations 1-3 in col. 8-9 & 11-18 and col. 10, lines 5-8) having beam path within a reduced-pressure chamber (col. 4, lines 36-40 and 146a-c in Fig. 3), providing a cluster ion beam attenuator (120 in Fig. 3) (which, according to the specification of the instant application (pp 10-11) "...is a metal plate having a small circular attenuator aperture.."). Dykstra discloses method of measuring electrical beam current by a current sensor like a Faraday enclosure (col. 5, lines 42-47, col. 7, lines 23-34, and 222 in Fig. 3). By using equations 1-3, the ratio of electric current to particle flow yields the cluster charge and by combining energy and mass per unit charge, other parameters of charge, energy and mass can be calculated. It is obvious that measurements of charge, mass, energy and their various ratios can readily be converted to their average values, for example, by simply repeating the

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measurements and taking their averages. Thus, measurements of these well known quantities for ions using basic equations of physics often used for such measurements can hardly be regarded as innovative.

4. With respect to dependent claims 7, 12, 17, and 22, Dykstra discloses that in accordance with the methods of above-mentioned independent claims, the cluster ion beam is a gas cluster ion beam (col. 4, lines 49-51).

5. With respect to claims 1-6, 8-11, 13-16, 18-21, and 23-34, Dykstra fails to disclose various details of the apparatus utilizing a gas cluster beam for processing of a workpiece. Mack et al., however, disclose an apparatus utilizing a gas cluster ion beam for processing a surface of a workpiece, the apparatus comprising: a vacuum vessel (col. 14, line 20), a gas cluster ion beam source within the vacuum vessel for producing a gas cluster ion beam (col. 14, lines 21-22); an accelerator for accelerating the gas cluster ion beam along a beam path (col. 14, lines 23-24); workpiece holding means within the vacuum vessel for holding the workpiece for gas cluster ion beam processing (col. 14, lines 31-32); first controllable moving means for selectively scanning said workpiece holding means and the workpiece through said accelerated gas cluster ion beam at a location along said beam path and for selectively removing the workpiece holding means and the workpiece from the gas cluster ion beam path (col. 5, lines 41-53 and 148, 152 in Fig. 2); cluster ion beam current measurement means for measuring a current of the attenuated sample of the gas cluster ion beam (col. 5, lines 59-65, col. 7, lines 45-49 & 60-61, and 232 in Fig. 4); particle flow rate measurement means for measuring a particle flow rate of said attenuated sample of the gas cluster ion beam;

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time-of-flight measurement means for measuring an average velocity of cluster ions in said attenuated sample of the gas cluster ion beam (col. 3, lines 27-30, col. 7, lines 45-51 and col. 6, lines 34-40); means for measuring an average energy per charge, (E/q) average, of the cluster ions in the attenuated sample of the cluster ion beam; calculating means for processing measurements of (E/q) average, flow rate, beam current and average velocity, to calculate a measure of an average mass of cluster ions in the gas cluster ion beam (col. 3, lines 17-45 and equations 1-3).

It would have been obvious to one having ordinary skill at the time of the invention was made to combine methods and apparatus of Dykstra and Mack et al. and add features like means for selectively positioning the attenuator within the gas cluster ion beam path for forming sample of cluster ions or for positioning the attenuator away for workpiece processing, because Dykstra teaches (col. 1, lines 37-40) that ion clusters are effective for a variety of surface modification processes without the tendency to produce deeper subsurface damage characteristic of monomer ion beam processing.

Conclusion

6. Gammel et al. disclose (5,153,430) method and apparatus for measuring the momentum, energy, power and power density profile of intense particle beams.

7. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you

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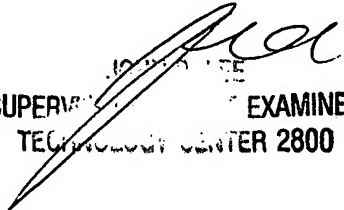
have questions on access to the Private PAIR system, contact Electronic Business Center (EBC) at 866-217-9197 (toll-free).

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zia Hashmi whose telephone number is (571) 272-2473.

The examiner can normally be reached between 8.30 AM- 5 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R. Lee can be reached on (571) 272-2477.

Zia Hashmi

April 20, 2005.


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